Accelerator Systems Division Highlights Ending January 28, 2005

ASD/JLAB: Cold Linac

Assembly of the H-12 and H-2 cryomodules continues on schedule.

ASD/BNL: Ring.

Shipped this week:

- Quad doublet assembly #1 and stand for the collimator straight section.

We will ship the following equipment next week (2/3/05):
Truck #1:

- chicane dipole #2 and stand
- chicane dipole #3 and stand
- chicane dipole #4 and stand

Truck #2: (delayed from 1/27 to 2/3/05)

- Injection kicker magnet (short; last one)
- RF power supply
- Wall Current Monitor (WCM) for RF straight section
- RTBT vacuum chambers
- SNS BLM – 1 crate of 23 ion chambers (#4 of 4)
- SNS Electron Detectors – 1 crate of 7 electron detectors and hardware
- LANL Motion Equipment – 1 box of motor drive equipment (controller/interface/cables etc.)
- SNS 2U BCM – 1 box of chassis retrofit parts (7 PCI cards/7 calibrator cards/cables etc.)
- SNS 2U BCM – 8 boxes of 2U chassis
- SNS BLM – 3 crates of 206 Ion Chambers (#1(71), 2(79) &3(56) of 4)
- SNS 4U BCM – 6 boxes of 4U chassis on 2 wrapped pallets

The following week, 2/8/05, we will ship quad doublet #2 for the collimator straight section.

Our TiN coating schedule is being examined to determine if we can accelerate the assembly, testing and delivery of the BIG chamber to Oak Ridge. After review and approval from H. Hseuh, the new coating priorities will likely be IPM, BIG, followed by the chicane chambers.

Final assembly continues on:

- The K2 extraction kicker magnets (bake-out blankets are being fitted to the vacuum chamber). The assembly will be ready for shipment in early February.
- The K1 extraction kicker assembly.
- The modified vacuum chamber for the #2 injection dump septum magnet.
- Quad doublet assemblies for the collimation and extraction straight sections.

Jim Rank returned from a visit to Alpha Magnetics. He has approved the extraction Lambertson septum magnet for shipment to BNL. Alpha plans to ship by 2/1/05.

RTBT 17D224: Pioneer Steel has completed all machining of the magnet core. The core was painted this week. They plan to ship next week.

36Q85 quads: three quads have been measured; a cross calibration of the second test station is underway using quad assembly #2. Unit four is ready for testing.

IPM chambers are being prepared for TiN coating.

Preliminary installation drawings of the Injection Dump line were sent to ASD for review.

Power Supplies: Power supply deliveries to SNS/OR continue. All supplies except for 12 medium range units have been delivered.

Controls

At BNL, the second motion control rack has been fully assembled. This rack will be located in the Ring service building, and will interface with the ring scrapers and the injection stripping foils ("chainsaw" and thick foil). It is now waiting to be moved to the motion control test building, where it will join the HEBT motion control rack. There the final electrical checkout and integration testing using EPICS screens will be performed.

The Ring Service Building communications cable design has been completed. SROs will be submitted next week. We will now start on the Target Building communications cable design.

Communications cable installation continued in the CLO Central Equipment Room (CER) and Central Control Room (CCR). Installation in this area has proceeded about as far as it can until the consoles arrive. Installation of communications cables also continued in the SCL section of the Klystron Building

Three Operator Interfaces were brought on-line in the "southern arc" of the Central Control Room.

Software support for RF included the following activities:
- Started work on calculating the delay between a feed-forward signal and the cavity response.
- Looked into methods for determining the field and energy in the SCL cavities.
- Supported SCL RF Conditioning
- A meeting was held between Controls and the RF Group to discuss Ring LLRF handover.

Work on the LEBT/MEBT Chopper controller preliminary design continued.

Cryomodule HB1 vacuum control system testing was completed and signed off. The RF conditioning for this module started on Wednesday. Testing of HB2 through HB4 vacuum controls (in the same vacuum rack) is now in progress.

Installation

Craft Snapshot 1/25/05

ASD productive craft workers	**65.0**
Foremen (Pd by 15% OH)	6.0
AMSI management (Pd directly)	3.0
TOTAL AMSI WORKERS	74.0
Less WBS 1.9, 1.2 etc	**13.0**
Less absent	**4.0**
TOTAL PD BY ASD/ORNL DB WPs	**48.0**

Accelerator Physics

A meeting was held 24/Jan/05 to discuss dummy vacuum chambers to temporarily replace some ring diagnostics stripline kickers, stripline pickups, and ionization profile monitor chambers, since it is unlikely these diagnostics will be ready to install in time for first beam. We concluded that the dummy vacuum chambers should be fabricated and installed, and that titanium nitride coating of these chambers is not absolutely necessary. However, we will strive to apply this coating here at ORNL once the coating equipment has been transferred from BNL to ORNL.

Good progress was made on the view screen for target commissioning. It was determined that mounting the view screen parallel to the target face is non-optimal from the optics perspective. The target design group now has a new conceptual design for mounting the screen at 45 degrees, which is much better for the optics.

A diamond stripper foil has been prepared for testing at the Proton Storage Ring in Los Alamos. It will be shipped on 28/Jan, and if it arrives intact, the plan is to install it next week.

Operations

Ion Source

Survey and Alignment

Mechanical

The DTL/CCL commissioning beam dump has been removed from its sarcophagus and the top and side shielding blocks as well as the steel reinforcing have been removed.

This week has been used for final RF and water system testing prior to the February shut down.

Diagnostic testing of DTL5 was performed and we are ready to "get a look inside" as early as next week.

Plans for a dust barrier between the CCL and SCL have been finalized to allow for the block maze removal.

MB03 through HB02 Warm Sections are set in place. HB03 and HB04 Warm Sections are being aligned. HB14, a "Dummy" Warm Section is assembled and will be transferred to its Linac location Monday. The same is true for HB21, a Warm Section with a Wire Scanner. We now have just 14-8Q35's left to map and fiducialize. We also started mapping 21Q40 Quadrupoles for the RTBT.

Water Systems Installation

- Installation of the Linac SCL ME08 rack cooling system continued.
- Installation of the Linac SCL Cryo Warm Section Magnet cooling connections continued.
- Installation of the Ring Tunnel RF Cavity cooling connections was started.
- Installation of the Ring Tunnel Magnet cooling connections was started.
- Installation of the Ring SB Power Supply cooling system manifolds continued.

Ring Systems Installation

- The HEBT Dipole Magnets/chambers were aligned for connection to adjacent magnets.
- The Ring RF straight section downstream Doublet Magnet assy was installed.
- The mounting hardware for the Ring Collimator straight section Doublet Magnet stands was installed.
- The balance of RTBT 21Q40 magnet stands were aligned in preparation for grouting.

Electrical Group

Linac Tunnel – Completed cable terminations for SCL module HB-5 working on cable terminations for SCL module HB-6 and HB-7, warm section terminations

SCL ME-5 area – diagnostics, controls and vacuum terminations in progress
SCL ME-6 area – cable pulling and ac power installation in progress
SCL ME-7 area – cable tray and rack installation
SCL ME-8 area – ac power terminations, diagnostics and vacuum cable pulls in progress

Ring – ac power terminations for rf systems, PPS wiring, and rack installation in progress.
CLO Control Room – terminations in progress

Completed integrated magnet/power supply/controls testing for SCL warm section MB-6 and MB-9, bringing the completed warm section integrated magnet/power supply/controls tests to 7 of 34.

Completed integrated magnet/power supply/controls testing for 5 HEBT power supplies: HEBT_MAG:PS_QV03, HEBT_MAG:PS_QV05, HEBT_MAG:PS_QV07, HEBT_MAG:PS_QH08 and HEBT_MAG:PS_QV09, bringing the number of completed HEBT integrated magnet/power supply/controls tests to 6 of 22.

Received deliveries of 6 Ring Medium Power Supplies – 4 of each 900 A, 51 V supplies and 2 each of 1300 A, 95 V supplies. This brings total deliveries on this final power supply contract to 65 of 77 units, with 12 remaining. The remaining supplies are scheduled for delivery in the next 2 months. All other power supplies have been delivered.

Installed Power Supplies in ME-8 area – all but 4 (of 260) linac power supplies have been installed.

Installation of the majority of SCL-ME6 was completed this week with the exception of the IGBT switch plate assemblies. Testing should begin in a few weeks when AC power is available. Installation continues on SCL-ME7. The last SCR unit and remaining GFE from Dynapower shipped this week. Testing of the prototype IGBT drive card with anti-saturation circuitry began this week. Preparations for development work on SCL-ME1 began but were delayed due to extension of the SCL cryo module RF testing program

HPRF

Ring RF

- Working on wiring documentation.
- Mounted power supplies in the Anode Rack for the 2nd RF Station.
- Waiting for electricians to complete AC wiring.

LLRF

Cryo Group

HB1 cooled down and tested

HB2 work completion for next week cool down.

Moving out of 8550 and relocation of equipment

24/7 Cryo Plant Operation at 4K

Cryomodule Testing

- Cooled down and tested cryomodules MB08 and HB01 (three out of four cavities) at 4.2 K.
- Calibrations of fields are in progress and will continue through the weekend.
- Determining limits and limitations of each installed cavity.
- Operated 30 cavities simultaneously (MB03-HB01), some in closed loop at gradients around 10 MV/m and full pulse length.

Beam Diagnostics

<u>Diagnostic Installation Work In Progress</u>

SCL

1. Several of the SCL racks have the chassis mounting angles and slides installed. Electrical installation is continuing.
2. The vacuum valves air lines interfere with Laser system junction boxes installed at HB08 and HB11. The resolution to this problem has not been formalized. I gave John Crandall the drawing showing the location of the junction boxes so they could re-route the air line.
3. Work is in process to update SCL cabling documentation for the addition of Neutron Detectors and the new Laser scanner located at the downstream end SCL HB21. SCL updates have been turned in and work is in process. The SRO to pull the cables for the new laser scanner system has been put in.

4. Low Energy CCL-to-SCL transition installation is scheduled for April-15-2005. The diagnostics Group needs to prepare
    1. (2) BPMs,
    2. (1) Wire-Scanner and
    3. (1) BCM.

HEBT

1. Electrical inspection has been completed by Paul Holik. Paul was happy with our installation but two exceptions need to be cleared;
    a. The circuit breakers were installed upside down.
    b. There are a few places where the conductor is exposed from terminals.

    This work has not started. This work will be scheduled and completed by the electrical group.

Ring

1. Found that one of the power panels mounted on the wall was in front of one of our racks. We plan to move the rack row out 8”from the wall to provide clearance.

General

1. The rack and cable modifications are also in progress to add LW32 and move the laser camera system that was at LW32’s location. SRO for pulls and terminations has been turned in.
2. Timing Test Bed and special projects as defined by Jim Pogge and Saeed continue to dominate Syd’s work load.
3. Syd finished the 8 original electron collector amp/bias “T” boxes. We have to build one more to accommodate the addition of laser scanner 32.

RF Distribution

1. The original request to the RF group was to build 13 chassis with 8 each LO outputs, 8 each Cal outputs, 8 each 2.5MHz outputs and 2 each 10 MHz outputs.
2. They have 6 chassis completed, 2 need only the fiber receivers installed, 4 have the components installed but need to be wired and 1 that is not started.
3. We have to remove the fiber receivers from the 10MHz lines in the completed chassis in order to have enough to install the three primary frequencies.
4. Overtime will be required to finish this work.

CLO Lab

1. The plan and estimates are complete. We still have not received word on when/if lab preparation will begin.
2. Andy completed a briefing with Sam McKenzie to learn where lab space manager information was on the web. We have to create an RSS for the Mezzanine, C-141, and the C-143 labs.

<u>NADs, Data Management</u>

1. Dave turned in our cable list to Teresa for cable purchasing. These are the cables for the rest of the accelerator. She understands that more will be added because of these 2nd tier devices. She also knows that final rack positioning is not set.
2. This cable list includes 1/4" Heliax for all BCMs and BPMs.
3. Got our image working on several PCs and have implemented BNL software. Works like a charm. I don't see any problems.
4. Got PC count for BCMs
5. Got Halo and VFM data
6. Continuing effort to complete BNL trip tasks.

<u>Software</u>

1) Wim supported BLM data capture and analysis with Saeed to assist with SCL conditioning.
3) Added calibration analysis to BCM: status analysis of Tc is there but not yet in feedback loop as it needs averaging.
4) Work on Timing Card by Cary. We have now a NI VISA driver for the BCM timing card (Not yet for the whole BPM card as we need DMA support as well)
5) Started BPM template with Chris.

System R&D, Physics

1. The updated SCL Laser profile monitor installation plan was presented in the laser meeting.

General

Tom attended the PAC05 program committee meeting and gave a seminar at U of MD.
A plan for restoring resources to diagnostics activities has been developed. It includes a list of specific tasks and resources that support the SCL and Ring commissioning milestones.
Wim Blokland, Dave Purcell and Cary Long traveled to BNL. A trip report is forthcoming.